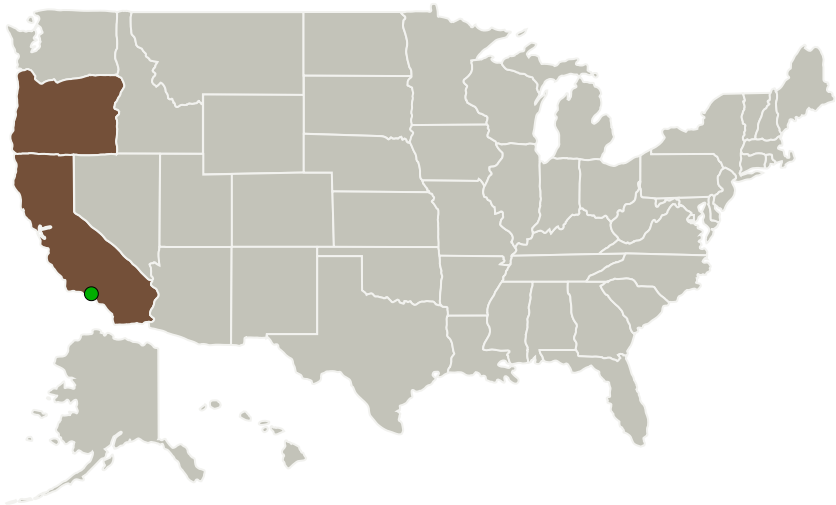
Radiation-Hardened, Substrate-Removed, Metamorphic InGaAs Detector Arrays, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

High-performance radiation-hardened metamorphic InGaAs imaging arrays sensitive from the ultraviolet (UV) through the short-wavelength infrared (SWIR) will be developed. The proposed detector arrays will offer near-BLIP sensitivity, with R0A values comparable to HgCdTe detectors, but with superior sensitivity, better uniformity, lower dark current, and much better pixel yield. Typical InGaAs detectors have little response beyond 1650 nm due to the band edge of the InGaAs alloy composition that is lattice-matched to the InP substrate, and the InP substrate blocks short wavelength response below 950 nm in back-illuminated focal plane arrays. The proposed detector will employ low-dislocation-density metamorphic InGaAs to extend long wavelength response to 2.6 um. Chemical/mechanical substrate removal and a surface doping gradient designed to collect photocarriers generated near the light-entry surface of the detector will extend its short-wavelength response. Prototype single-element detectors and segmented arrays will be demonstrated in Phase I. In Phase II, material quality will be refined through additional manufacturing development, and large area arrays will be fabricated. By the end of Phase II, extended-spectral-range InGaAs imagers based upon the new metamorphic detector and a radiation-hardened readout integrated circuit (ROIC) will be demonstrated. Voxtel anticipates that its technology will enter the program at TRL=3, finish Phase I at TRL=5, and exit the Phase II program at TRL=6.

Primary U.S. Work Locations and Key Partners



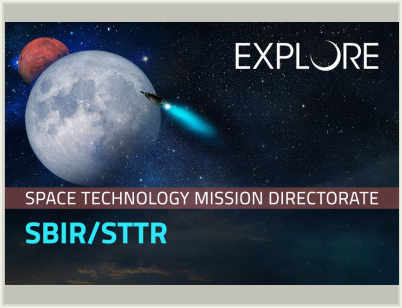


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Table of Contents

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Organizations Performing Work	Role	Type	Location
Voxtel, Inc.	Lead Organization	Industry	Beaverton, Oregon
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations	
California	Oregon

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138442)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Voxtel, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Andrew Huntington

Co-Investigator:

Andrew Huntington

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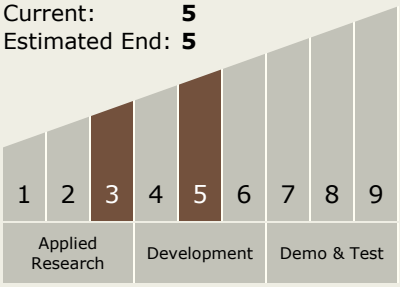
Completed Technology Project (2011 - 2011)

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System